

	INDIANA DEPARTMENT OF TRANSPORTATION INTER-DEPARTMENT COMMUNICATION <i>Standards Section – Room N642</i>	
<i>Writer's Direct Line</i> 233-2273		

September 9, 2005

DESIGN MEMORANDUM No. 05-31
TECHNICAL ADVISORY

TO: All Design, Operations, and District Personnel, and Consultants

FROM: /s/ Anthony L. Uremovich
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SUBJECT: Public Road Approaches and Drives

REVISES: *Indiana Design Manual* Sections 46-7.0 and 46-11.0, Respectively

EFFECTIVE: March 15, 2006 Letting

PUBLIC ROAD APPROACHES

A. Design Vehicles

Details for public road approaches shown in INDOT *Standard Drawings* 610-PRAP-02 through -12 have been revised and dated March 2006 to incorporate additional information to aid the designer in selecting the appropriate public road approach type that will accommodate the corresponding Indiana Design Vehicles.

The computer program AutoTURN, version 5, was used to verify the maximum size of the Indiana Design Vehicle that can be accommodated by a particular public road approach type. The templates of Indiana Design Vehicles WB-15 (WB-50) and WB-20 (WB-65) were superimposed over layouts of the approaches with intersection control angles of 70 through 110 deg showing the turning path of the selected Design Vehicle making a right-hand turn at the intersection.

The maximum turning design speed for a right-hand turn onto any public road approach is limited to 15 km/h (10 mph). An intersection control angle of less than 70 deg or greater than 110 deg is not typically used and will require a special design. The design vehicle is positioned within the traffic lane at the beginning and end of the turning maneuver, preferably 0.6 m (2 ft) from the edge of pavement on the tangents approaching and leaving the intersection curve. The inner wheelpath of the design vehicle should clear the edge of the pavement by 0.6 m (2 ft) or more throughout most of the turn, and at no point by less than 0.2 m (0.75 ft).

B. Types of Public Road Approaches

The warrants for each type of public road approach are as follows:

1. Public Road Approach Type A. This approach should be used where the mainline shoulder is unpaved, or, if paved, is less than 2.4 m (8 ft) in paved width.
2. Public Road Approach Type B. This approach should be used where the mainline shoulder is paved, and is 2.4 m (8 ft) or wider in paved width. A paved shoulder of this width or greater will encourage use by a right-turning vehicle to clear the mainline traffic lane when decelerating for the turn.

Public road approach types A and B are designed to accommodate design vehicles WB-15 (WB-50) or smaller with right-hand turns beginning and ending in the traffic lanes. Right-turn lanes are not provided for these approaches. Either of these approaches should be used for a public road serving a residential, light-commercial, or light-industrial area.

3. Public Road Approach Type C. This approach should be used where the mainline shoulder is paved, is 2.4 m (8 ft) or wider in paved width, and an auxiliary right-turn lane along the mainline is warranted due to the right-turning traffic volume. This approach is designed to accommodate design vehicles WB-15 (WB-50) or smaller without encroaching onto the adjoining traffic lane. It will also accommodate a WB-20 (WB-65) design vehicle if a portion of the adjoining traffic lane is utilized. This approach should be used for a public road serving a residential, light-commercial, or light-industrial area.
4. Public Road Approach Type D. This approach should be used where the mainline shoulder is paved, is 2.4 m (8 ft) or wider in paved width, and an auxiliary right-turn lane along the mainline is warranted due to the right-turning traffic volume. This approach is designed to accommodate design vehicles WB-20 (WB-65) or smaller. This approach should be used where two Department-maintained routes intersect, or for a public road serving a commercial area, heavy-industrial area, or truck stop.

Figure 05-31A summarizes each type of public road approach and the corresponding appropriate design vehicles it can accommodate.

Public Road Approach	Appropriate Design Vehicle
Type A <ul style="list-style-type: none"> • Paved or unpaved shoulder width < 2.4 m (8 ft). • Approach radius starts from edge of travel lane. • Right-turn lane along mainline is not warranted. • Serves residential, light-commercial, or light-industrial area. 	WB-15 (WB-50) or smaller
Type B <ul style="list-style-type: none"> • Paved shoulder width \geq 2.4 m (8 ft). • Approach radius starts from edge of shoulder. • Right-turn lane along mainline is not warranted. • Serves residential, light-commercial, or light-industrial area. 	WB-15 (WB-50) or smaller
Type C <ul style="list-style-type: none"> • Paved shoulder width \geq 2.4 m (8 ft). • Approach radius starts from edge of shoulder. • Auxiliary right-turn lane along mainline is warranted. • Serves residential, light-commercial, or light-industrial area. 	WB-15 (WB-50) or smaller WB-20 (WB-65) if adjoining traffic lanes are utilized.
Type D <ul style="list-style-type: none"> • Paved shoulder width \geq 2.4 m (8 ft). • Approach radius starts from edge of shoulder. • Auxiliary right-turn lane along mainline is warranted. • Used at intersection of two Department-maintained routes. • Serves commercial area, heavy-industrial area, or truck stop. 	WB-20 (WB-65) or smaller

Note: If one of these standard public road approach types cannot be used at a particular intersection site, the public road approach should be designed and the intersection details should be shown on the plans.

PUBLIC ROAD APPROACH TYPES AND CORRESPONDING DESIGN VEHICLES

Figure 05-31A

C. Determining Pavement Pay Items

If for a public road approach type A, B, or C, the ADT is 1000 or less, or for a public road approach type D, the ADTT of FHWA Class 5 trucks is 50 or less, the minimum pavement section shown on the INDOT *Standard Drawings* should be specified.

If for a public road approach type A, B, or C, the ADT is greater than 1000, or for a public road approach type D, the ADTT of FHWA Class 5 trucks is greater than 50, ESALs must be determined as described in *Indiana Design Manual* Section 52-8.03(01).

For an HMA approach, the required mix type is determined based on ESALs as shown in *Indiana Design Manual* Figure 52-9B. The courses and densities should be those identified in the minimum pavement section shown on the INDOT *Standard Drawings*.

For a PCCP approach, the pavement thickness is determined as described in *Indiana Design Manual* Section 52-8.03(03).

The pay items to be specified should be as described in Recurring Special Provision 610-R-502, attached hereto, and as shown on the INDOT *Standard Drawings*.

DRIVES

I. General Information

A. Definitions of Drives and Types

The definitions of types and classes of drives are as follows:

1. Residential. A residential drive provides access to a single family residence, duplex, or apartment building with not more than four dwelling units. A residential drive along a roadway with a raised curb is a class I drive. A residential drive along a roadway with a paved or unpaved shoulder and no raised curb is a class II drive.
2. Commercial. A commercial drive provides access to an office, retail, or institutional building, or to an apartment building with five or more dwelling units. A drive which serves an industrial plant, but with a primary function to serve an administrators' or employees' parking lot, is considered to be a commercial drive. A commercial drive along a roadway with a raised curb is a class III drive. A commercial drive along a roadway with a paved or unpaved shoulder and no raised curb is a class IV drive.

3. Industrial. An industrial drive directly serves substantial numbers of truck movements to and from loading docks of an industrial facility, warehouse, or truck terminal. A centralized retail development, such as a community or regional shopping center, may have one or more drives especially so designed, signed, and located to provide access for trucks. This is also classified as an industrial drive. An industrial drive may be designed either as a public road approach or as an industrial drive. An industrial drive along a roadway with a raised curb is a class VII drive. An industrial drive along a roadway with a paved or unpaved shoulder and no raised curb is a class VI drive.
4. Field Entrance. A field entrance provides access to an unimproved property, e.g., a farm field with no buildings. Such a drive along a roadway with a paved or unpaved shoulder is a class V drive.

B. Drive Spacing and Corner Clearances

Closely-spaced drives can cause operational problems, especially with a high-volume roadway and/or high-volume drives. These problems can also result if a drive is too close to an at-grade intersection.

Desirably, any part of a drive, including its entrance radius, should not be placed within the radius of a public road at an intersection, including any auxiliary lanes. Preferably, there should be a 6- to 12-m (20- to 40-ft) tangent section between the drive radius and the public road radius for greater separation. If this criterion cannot be met for a property at an intersection corner, one solution may be to relocate the drive entrance from the major road to the minor road, if practical. Another possible solution is to provide a right-turn lane at the intersection. This will improve the operation of the intersection by removing the turning vehicles for the drive and intersection out of the through travel lane(s). However, significant numbers of turning vehicles may impair egress from the property.

Drives for the same owner should be located across from each other (e.g., a farm) where crossing traffic is significant or where it is not desirable to permit slow or large equipment to travel along the highway or shoulder.

C. Drive Sight Distance

Indiana Design Manual Section 46-10.0 discusses intersection sight distance (ISD) criteria for an intersection with a public road. Desirably, these criteria will also apply to sight distance at a drive. However, for a drives with low traffic volume, it is not warranted to explore extraordinary measures to improve sight distance. Sight obstructions, e.g., large trees, hedgerows, etc., should be checked

for in the vicinity of the drive entrance which may limit sight distance. To perform the check, it is reasonable to assume an eye location of approximately 3 m (10 ft) from the edge of travel lane.

If drive sight-distance criteria with the eye location described above cannot be met, informal notification should be provided to the project reviewer for a consultant-designed project or to the supervisor for an in-house project.

D. Auxiliary Lanes

Deceleration and acceleration lanes should be considered at each high-volume drive entrance, especially on a high-speed, high-volume arterial. *Indiana Design Manual* Sections 46-4.0 and 46-7.0 further discuss the design and warrants for these auxiliary lanes, which may also apply to a high-volume drive. In addition to traffic-volume considerations, it may be warranted to provide a right-turn lane into the drive if the change in grade is abrupt at the drive entrance.

E. Joint Residential or Commercial Drive

If practical and agreeable to the property owners, the use of a joint drive offers one option to reduce the number of access points along the highway. The centerline of the joint drive should be located on the property line dividing the two owners. This practice will not allow either owner the opportunity to deny or restrict access to the neighbor's property and, depending on the traffic volume, may improve the traffic flow on the mainline. For a commercial drive, this may require providing a drive wide enough to handle two-way traffic.

II. Design Criteria

The INDOT *Standard Drawings* series 610-DRIV, dated March 2006, provides the Department's design criteria for the various drive classes. In addition to such series, the following should be considered.

A. Class Determination Considerations

1. If it is determined from the survey or at the field inspection that a field entrance serves a barn or storage shed for farm machinery, it should be designed as a class II drive with a 7.2 m (24 ft) minimum width instead of a class V drive.

2. Where there are positive indications that a private residence is being used for commercial purposes, the drive should be designed as a commercial drive.

B. Radii

1. Class II and class IV drive radii should start from the edge of the paved shoulder if the width of the paved shoulder is 2.4 m (8 ft) or greater.
2. Class II and class IV drive radii should start from the edge of the traveled way if the width of the paved shoulder is less than 2.4 m (8 ft).
3. Class VI drive tapers should start from the edge of the traveled way without regard to the shoulder's width or whether or not the shoulder is paved.

C. Width

1. Drive width should be measured perpendicular to the centerline of the drive.
2. For each new drive constructed where no drive currently exists, the minimum width shown on the INDOT *Standard Drawings* series 610-DRIV, dated March 2006, should be used, unless determined otherwise at the field inspection or if the Land Acquisition Division recommends a wider width.
3. The width of a reconstructed drive should be the same as the existing width but not less than the minimum width nor greater than the maximum width shown on the INDOT *Standard Drawings* series 610-DRIV, dated March 2006.
4. Each drive that serves a barn or storage shed for farm equipment should be a minimum of 7.2 m (24 ft) in width.

D. Drive Grades

For a class I, III, VI, or VII drive, the maximum algebraic difference in drive grades should not exceed 8% for a crest vertical curve, or 12% for a sag vertical curve. For a class II, IV, or V drive, the maximum algebraic difference in drive grades should not exceed 11% for a crest vertical curve, or 14% for a sag vertical curve.

If it is known that large emergency vehicles or other large vehicles will be using a drive, or if the algebraic differences exceed those noted above, the fit of the drive grade should be checked against the vehicle templates.

Drive grades should be shown and drive PVIs should be identified on the cross-sections sheets.

E. Grading

The drive's embankment slope within the mainline clear zone should be as shown in Figure 05-31B, Drive Embankment Slopes Within Clear Zone. Outside the clear zone, the embankment slope should desirably be 4:1, but should not be steeper than 3:1.

Slope	Multi-lane Divided Highway	Other Arterial	Collector	Local Road
10:1	All	All	Design Speed ≥ 80 km/h (50 mph)	n/a
6:1	n/a	All	Design Speed ≥ 80 km/h (50 mph)	n/a
4:1	n/a	n/a	Design Speed < 80 km/h (50 mph)	All

DRIVE EMBANKMENT SLOPES WITHIN CLEAR ZONE

Figure 05-31B

F. Paving

1. Each residential, commercial, or industrial drive should have either an asphalt or concrete surface as shown on the INDOT *Standard Drawings* series 610-DRIV, dated March 2006, from the edge of the mainline pavement to at least the highway right-of-way line. The drive pavement should be replaced in kind beyond the right-of-way line only if required to match grade or alignment, and not to repair the drive due to condition.
2. A field entrance typically has an unimproved soil surface within the right-of-way, except as discussed in Section II A 1.

G. Intersecting Sidewalk Treatment

1. Sidewalk curb ramps should only be used with a signalized class III or class VII drive.
2. For a class I drive or nonsignalized class III or class VII drive, a sidewalk elevation transition as shown on the INDOT *Standard Drawings* series 610-DRIV, dated March 2006, should be used.

III. Impacts to Project with Drive Designs Complete and Right of Way Acquisition Under Way

Each Class I or III drive in a project to be let before March 2006 should have its grade designed in accordance with the INDOT *Standard Drawings* series 610-DRIV, dated before March 2006. However, the grade for each drive should be checked for accessibility by large emergency vehicles or other large vehicles.

Each Class I or III drive in a project to be let during or after March 2006 should have its grade designed in accordance with the INDOT *Standard Drawings* series 610-DRIV, dated March 2006. However, if the profile-grade requirements shown in such *Standard Drawings* extend an already-designed drive outside the available right of way, such drive should have its grade detailed on the plans so that the drive remains inside the available right of way. Such drive should also be checked for accessibility by large emergency vehicles or other large vehicles. Such drive should be identified as modified.

IMPLEMENTATION

A. Standard Drawings

The INDOT *Standard Drawings* 610-PRAP series for public road approaches and 610-DRIV series for drives, both dated March 2006, are accessible both on the Department's website, and the Design and Construction Reference Guide CD dated March 2006. The drawings are not attached hereto.

B. Specifications

Recurring Special Provision 610-R-502, attached hereto, should be called for beginning with the March 15, 2006, letting, and through the August 16, 2006, letting. Beginning with the September 13, 2006, letting, the recurring special provision will be incorporated into the INDOT *Standard Specifications*. The provision will then no longer be required to be called for in specific contracts.

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Attachment

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